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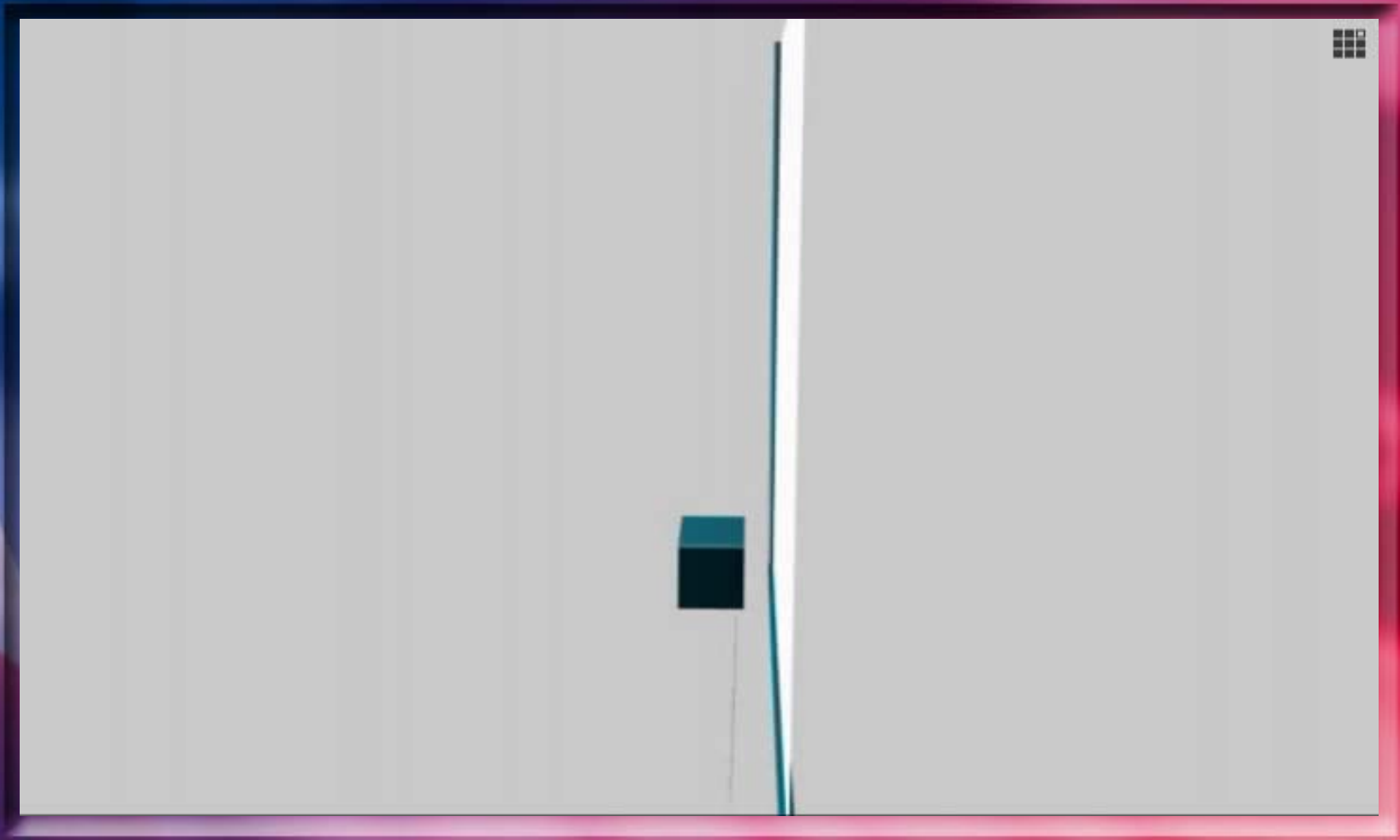
2002 Symposium
Transforming
Fantasy

Transforming Microelectronics

Edgar J. Martinez
DARPA/MTO

Transforming Microelectronics



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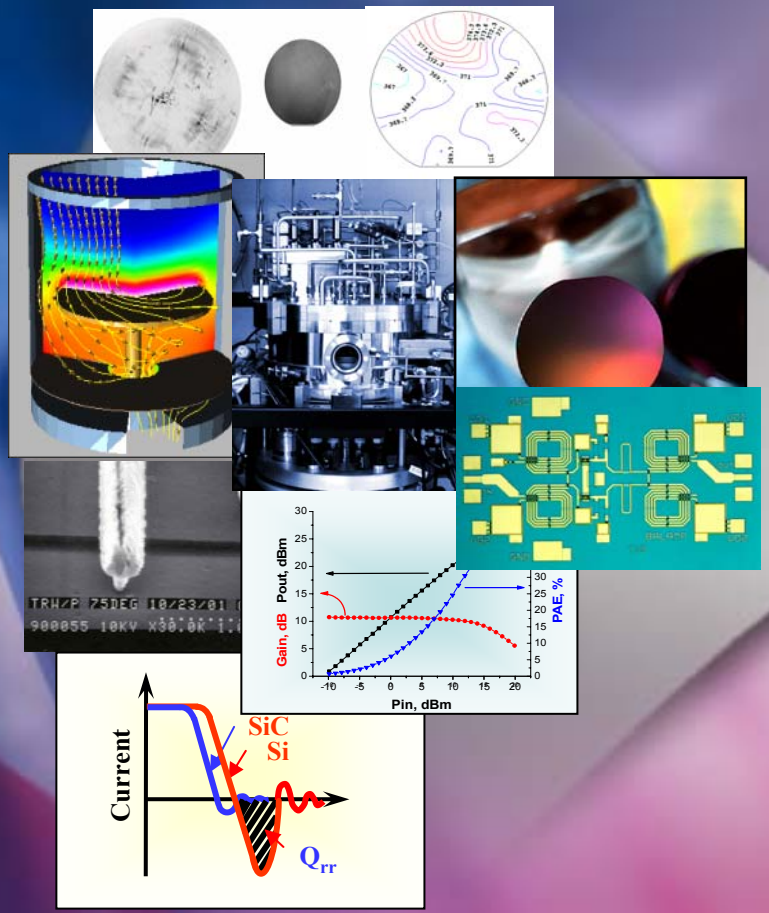
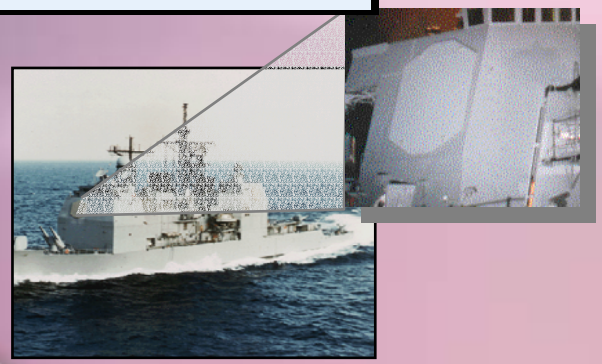
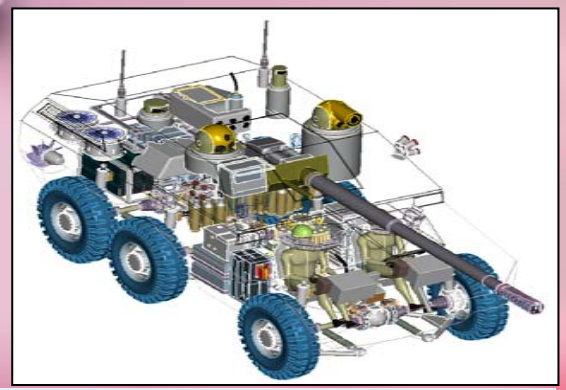
Wide Bandgap Semiconductor Technology Initiative



RF Electronics





High Power Electronics

E. Martinez J. Zolper

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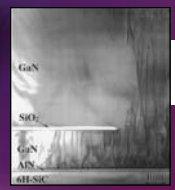
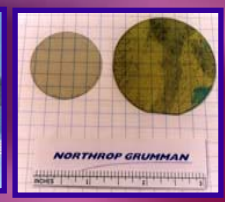
WBG Semiconductors Focus Areas

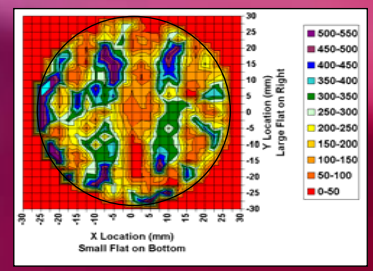
WBG Semiconductors Focus Areas

- **Material Technology**
  - Bulk Crystal
  - Epitaxial Materials





Epitaxial Materials



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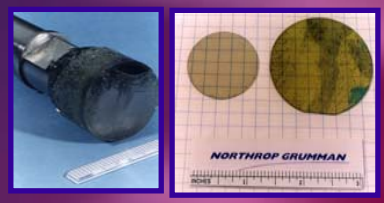
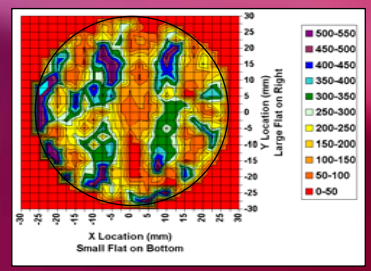
WBG Semiconductors Focus Areas

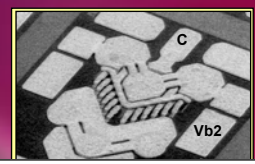
- **Material Technology**
  - Bulk Crystal
  - Epitaxial Materials



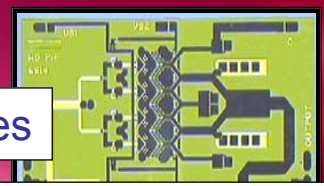
Epitaxial Materials



- **Device Technology**
  - Fabrication Processes
  - Device Physics
  - Device performance Optimization

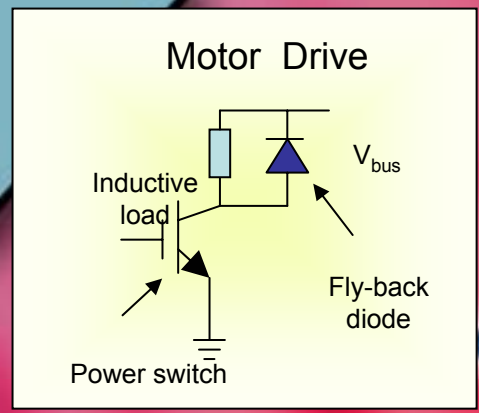


Electron Devices



RF Integrated Circuits

- **Integration**
  - Integrated Circuit Demonstration
  - Packaging and Thermal Management



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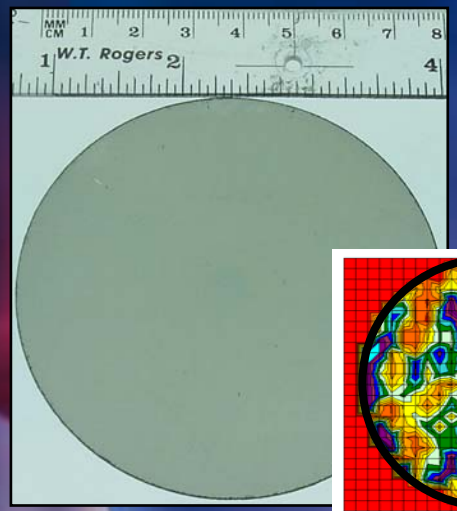
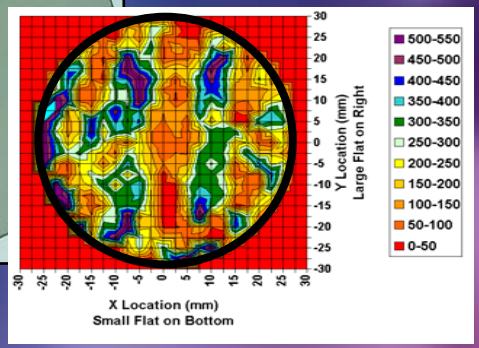
WBG Phase I Objectives

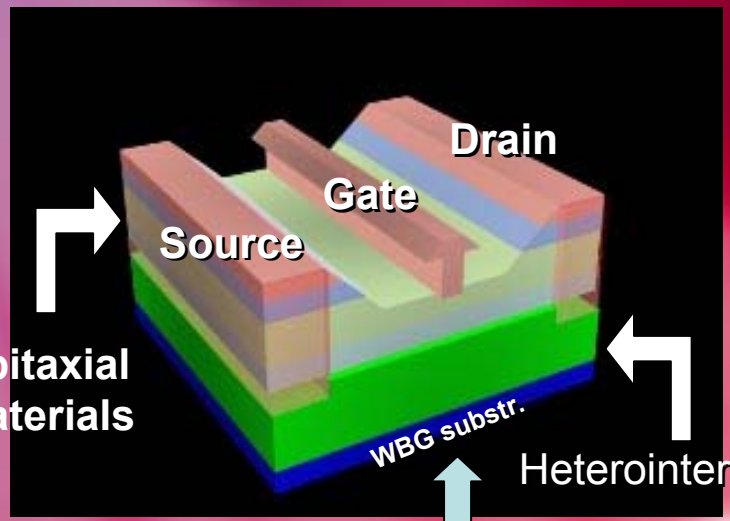




Four inch, high quality substrates

Optimization of epitaxial material processes for high uniformity, reproducibility, and device performance

Correlate material properties to device performance



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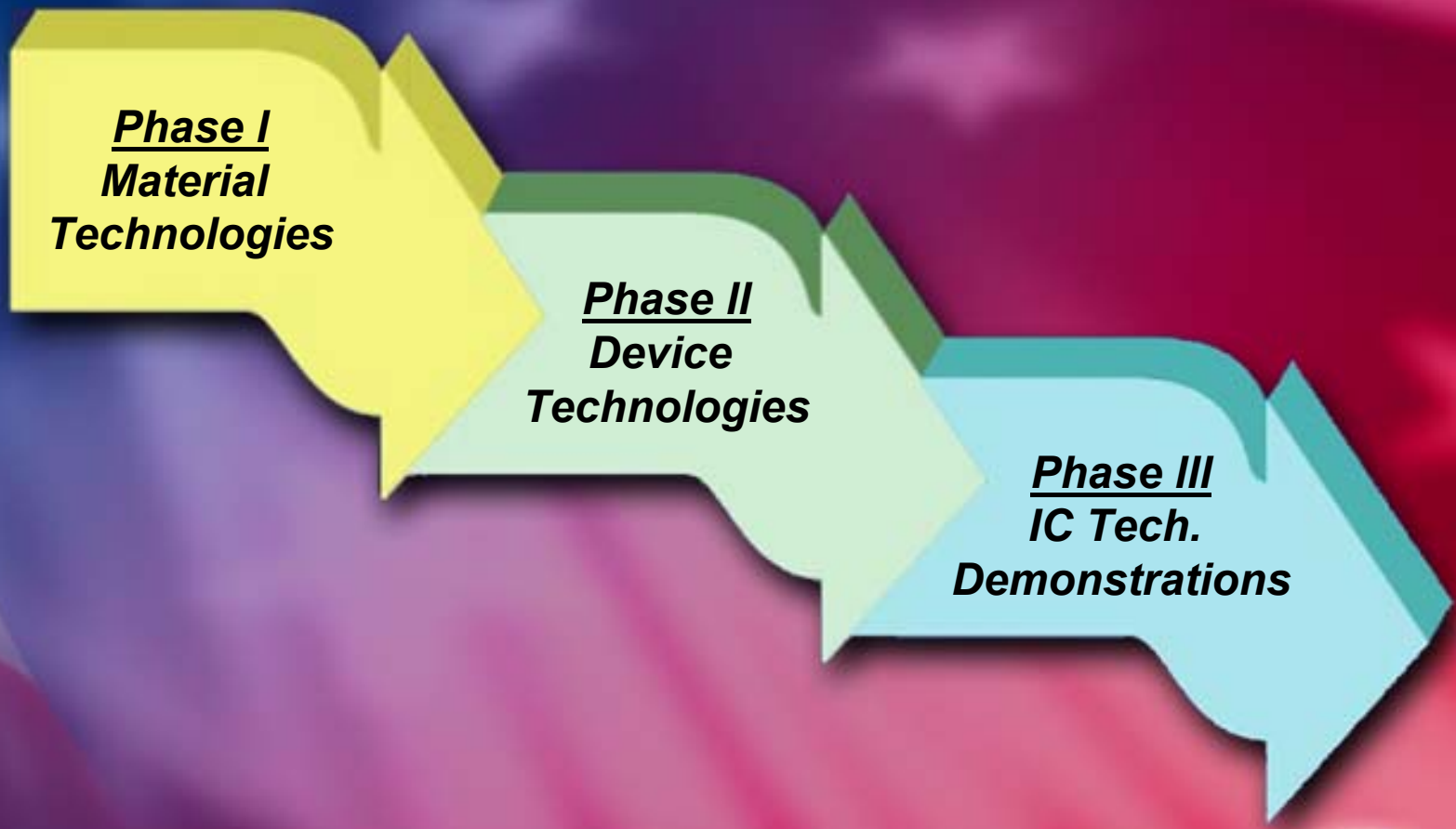
WBGSTI Program Plan



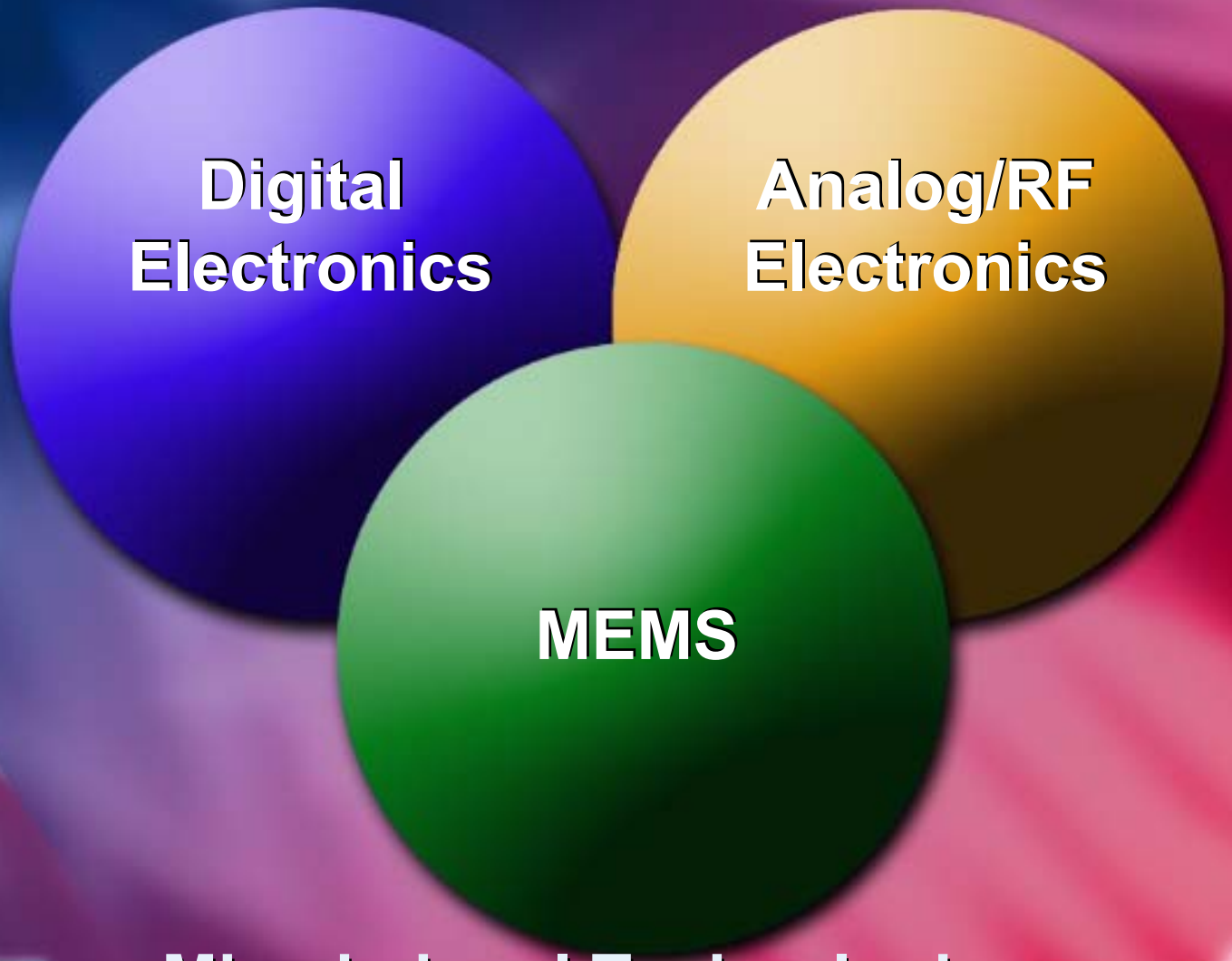
Applications of WBG Semiconductors

- Multifunction RF Sensors and Wireless Communication Networks
- Electronic Warfare
- Electro-magnetic Weapons
- Electric-Vehicles

CHIPS THAT CAN THINK

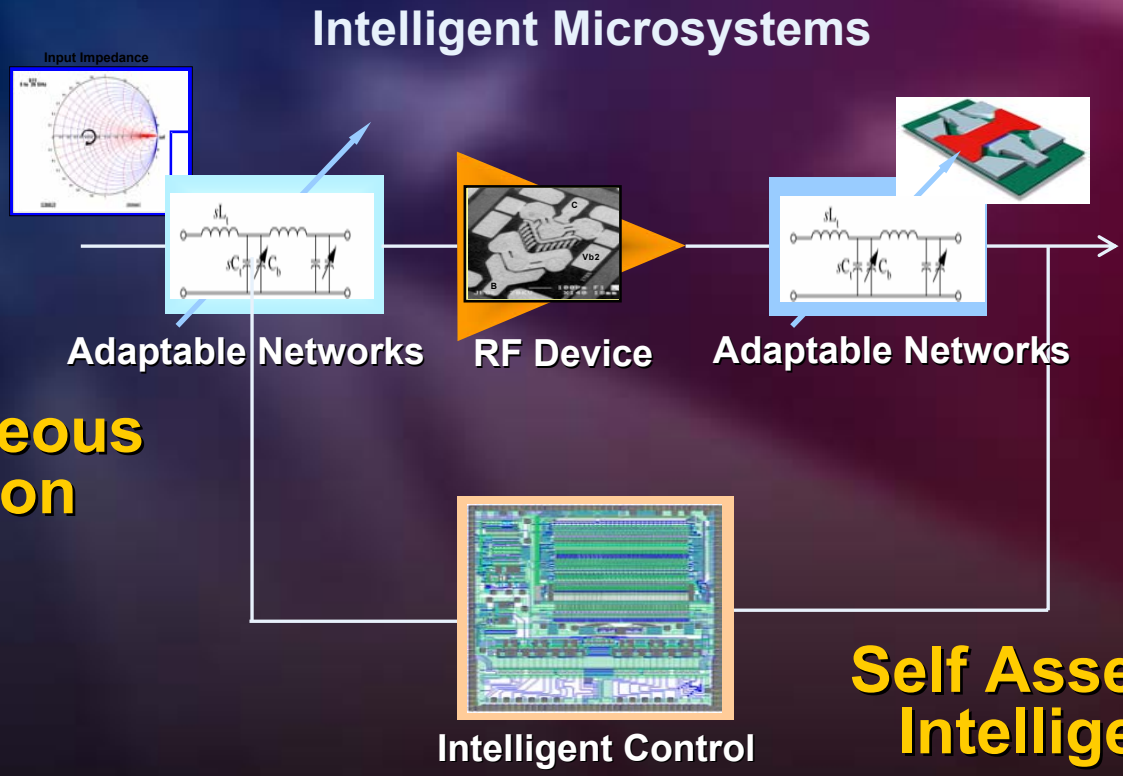
Enabling a new generation of integrated microsystems with the ability to exploit embedded information and convert it into knowledge to achieve superior levels of performance and adaptable functionality

Intelligent Microsystems



Mixed-signal Technologies

Intelligent RF Front Ends



Chips that can think to adapt to rapid changes in the battlefield environment

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Impact of Intelligent Microsystems

- System multi-functionality
- System adaptability to changes in battlefield environment or operational demands
- In-time mission training and reconfiguration
- Tolerance to aging effects
- Less sensitive to fabrication errors

Relevant Topics of Interest

Dr. Anantha Krishnan	Mixed-Signal Design Methodologies Three-Dimensional Microsystems Design
Dr. Edgar Martinez	Intelligent Microsystems Wide Bandgap Semiconductors
Dr. James Murphy	Vertically Integrated Sensor Architectures Mixed-signal Converter Technology
Dr. Robert Reuss	Advanced Silicon Technologies
Dr. John Zolper	Wide Bandgap Semiconductors Ultra High Speed InP Electronics


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